NOVEMBER/DECEMBER 2023

DEPH42A — CRYSTAL GROWTH AND THIN FILMS

Time : Three hours

Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions..

1. Distinguish between saturation and supersaturation.
2. Write Gibbs-Thomson equation.
3. List out the applications of ion implantation.
4. What is meant by sputtering?
5. What is meant by space group?
6. State Paulings' rules.
7. List out the applications of thin films.
8. What is meant by sol – gel?
9. Why X-rays are used to study the crystal structure?
10. Give the significance of second harmonic generation.

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SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the significance of Temkins model.

Or

(b) Explain the terms homogeneous and heterogeneous nucleation.

12. (a) Explain in detail about floating zone method of growing crystal growth.

Or

(b) With a neat diagram, explain the Verneuil growth process of growing crystal growth.

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13. (a) Discuss point defect and line defect in detail.

Or

(b) Determine the atomic radius and packing factor for simple cubic lattice.

14. (a) Explain the electron beam gun method of preparing the thin films.

Or

(b) What is meant by electrodeposition technique? How does it work?

15. (a) Explain the working of ESR.

Or

(b) Discuss the working principle of FTIR.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe in detail about the kinetic theory of nucleation.

17. Describe in detail about the different types of solution growth techniques.

18. What is meant by symmetry operations in crystals? Explain the different point group symmetry elements in a crystal lattice.

19. Explain different types of sputtering techniques and discuss how they differ from other methods.

20. Explain the working principle of Scanning electron microscopy with a neat diagram Give its merits.
